

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Ochrosia haleakalae*

COMMON NAME: Holei

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

**STATUS/ACTION**

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- \_\_\_ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- \_\_\_ F – Range is no longer a U.S. territory.
- \_\_\_ I – Insufficient information exists on biological vulnerability and threats to support listing.
- \_\_\_ M – Taxon mistakenly included in past notice of review.
- \_\_\_ N – Taxon does not meet the Act’s definition of “species.”
- \_\_\_ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Apocynaceae (Dogbane family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Maui and Hawaii

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Maui and Hawaii

LAND OWNERSHIP:

This species is found on private land and State-owned land on Maui, and State-owned and federally-owned land on Hawaii. Plants have been reintroduced into Hawaii Volcanoes National Park, which is federally owned land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul\_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa\_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Ochrosia haleakalae* is a tree 2 to 8 meters (m) (6.7 to 26.3 feet (ft)) tall. The elliptic leaves are clustered three or four per node. Tubular flowers occur in relatively open inflorescences. Robust, ovoid drupes are yellow or plum-colored, streaked with brown and often have irregular ridges at maturity due to differential thickening of the exocarp (Wagner *et al.* 1999a).

Taxonomy *Ochrosia haleakalae* was described by St. John. This species is recognized as a distinct taxon in Wagner *et al.* (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat Typical habitat is dry to mesic forest, often on lava, at elevations between 700 to 1,200 m (2,300 to 4,000 ft) (Wagner *et al.* 1999a). On Maui, the species occurs in diverse dry forest in the Auwahi area (Medeiros *et al.* 1986; Arthur C. Medeiros, U.S.G.S. Biological Resources Discipline, pers. comm. 1995). On the island of Hawaii, *Ochrosia haleakalae* occurs in

degraded *Metrosideros polymorpha*-*Pisonia sandwicensis* (‘ohi‘a-papala kepau) mesic forest in the Kohala mountains (Perlman and Wood 1996).

Historical and Current Range/Current Status This species is currently known from three wild populations totaling less than 500 individuals on east Maui and the island of Hawaii (Perlman and Wood 1996; A. Medeiros, pers. comm. 1995, 1999; Hank Oppenheimer, Maui Land and Pineapple Company, pers. comm. 2004 and 2005). On the island of Hawaii, more than 100 trees have been reintroduced in Kipuka Puauulu and Kipuka Ki in Hawaii Volcanoes National Park, with seeds from east Maui (Linda Pratt, U.S.G.S. Biological Resources Discipline, pers. comm. 2005). While we do not know the long-term population trends, it is reasonable to assume the populations have continued to decline, since not all of the threats are being managed throughout all of its range.

#### THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. *Ochrosia haleakalae* is highly and imminently threatened by feral ungulates (pigs and goats) on Maui (Medeiros *et al.* 1986; A. Medeiros, pers. comm. 1995). On the island of Hawaii, pigs (*Sus scrofa*) are the major threat (Perlman and Wood 1996). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitat. Pigs are currently present on five of the main islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Cuddihy and Stone 1990; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Wagner *et al.* 1999a). An ungulate exclusion fence protects the Maui population of this species and the reintroduced population in Hawaii Volcanoes National Park; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the wild populations on the Big Island are still impacted by this threat.

The goat (*Capra hircus*), a species originally native to the Middle East and India, was successfully introduced to the Hawaiian Islands in 1792. Currently, populations exist on Kauai, Oahu, Maui, and Hawaii. On Maui, feral goats have been present in drier, more rugged areas since the 1800s. Goats browse on introduced grasses and native plants, especially in drier and more open ecosystems. Feral goats eat native vegetation, trample roots and seedlings, cause erosion, and promote the invasion of alien plants. They are able to forage in extremely rugged terrain and have a high reproductive capacity (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al.* 1986; Tomich 1986; Culliney 1988; Cuddihy and Stone 1990). Although many plant species survive on steep cliffs inaccessible to goats, the original range of these plants was probably much larger. The habitat on leeward east Maui has been damaged in the past by goats, and these effects are still apparent in the form of alien vegetation and erosion (Corn *et al.*

1979; Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al.* 1986; Culliney 1988). An ungulate exclusion fence protects the Maui population of this species; however, without continued monitoring and maintenance of those fences, goats from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

Because Hawaii's native plants evolved without any browsing or grazing mammals present, many lost natural defenses to such impacts (Carlquist 1980, Lamoureux 1994). Browsing by ungulates has been observed on many other native species, including common and rare or endangered species (Cuddihy and Stone 1990; Loope *et al.* 1991). Therefore, even though there are no observations of browsing for this species, it is likely that pigs and goats impact this species directly as well as their indirect impacts to the surrounding habitat. An ungulate exclusion fence protects the Maui population of this species; however, without continued monitoring and maintenance of those fences, pigs and goats from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat.

D. The inadequacy of existing regulatory mechanisms.

Goats and pigs are managed in Hawaii as game animals, but many herds populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990). Goat and pig hunting is allowed year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. An ungulate exclusion fence protects the Maui population of this species; however, without continued monitoring and maintenance of those fences, pigs and goats from surrounding areas can easily access fenced areas. In addition, the Big Island populations are still impacted by this threat.

E. Other natural or manmade factors affecting its continued existence.

Alien plant species threaten this species (Medeiros *et al.* 1986; Perlman and Wood 1996; A. Medeiros, pers. comm. 1995). Although the exact pest species that threaten this plant have not been identified, alien pest plants are found throughout the areas where this species occurs. The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Confirmed personal observations (Medeiros *et al.* 1986; Perlman and Wood 1996; A. Medeiros, pers. comm. 1995) and several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Ochrosia haleakalae*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species

have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to the dry to mesic forest habitat of *O. haleakalae*, the Service believes nonnative plant species are a threat to *O. haleakalae*. Nonnative plants are being controlled around the Maui population of this species, but will probably never be completely eradicated because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands. Currently, many widespread alien plant taxa cannot be completely eradicated from Maui and the island of Hawaii, and therefore are expected to continue dispersing into previously managed areas (Loope 1998, Smith 1985). The remaining unmanaged populations of *O. haleakalae* are still impacted by this threat.

Because Hawaiian plants were subjected to fire during their evolution only in areas of volcanic activity and from occasional lightning strikes, they are not adapted to recurring fire regimes and do not quickly recover following a fire. Alien plants are often better adapted to fire than native plant species, and some fire-adapted grasses have become widespread in Hawaii. Native shrubland and dry forest can thus be converted to land dominated by alien grasses. The presence of such species in Hawaiian ecosystems greatly increases the intensity, extent, and frequency of fire, especially during drier months or drought. Fire-adapted alien plant taxa can reestablish in a burned area, resulting in a reduction in the amount of native vegetation after each fire. Fire can destroy dormant seeds as well as plants, even in steep or inaccessible areas. Fires may result from natural causes, or they may be accidentally or purposely started by humans (Cuddihy and Stone 1990, D'Antonio and Vitousek 1992; Friefelder *et al.* 1998). No known conservation measures have been taken to date for this threat.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED

In 1994, the Service funded the U.S.G.S. Biological Resources Discipline to fence the Maui population of *Ochrosia haleakalae* on private land. Since then, the fenced enclosure has been maintained ungulate-free, alien plant control is ongoing, and seven individuals have been reintroduced into the fenced area (U.S.G.S. Biological Resources Discipline 2005). The Service provided additional funding in 2005 to protect additional habitat of this species.

On the island of Hawaii, more than 100 trees have been outplanted in Kipuka Puauulu and Kipuka Ki in Hawaii Volcanoes National Park, with seeds from east Maui. This area has been fenced and weed control is on-going (Linda Pratt, U.S.G.S. Biological Resources Discipline, pers. comm. 2005). This species is represented in an *ex situ* collection at the Volcano Rare Plant Facility (U.S. Fish and Wildlife Service Controlled Propagation Database 2005).

#### SUMMARY OF THREATS:

The major threats to this taxon are feral pigs and goats that directly prey upon it and degrade and destroy habitat, nonnative plants that compete for light and nutrients, and fire, which are believed to be a major cause of the decline of this species throughout its range. Feral ungulates

have been fenced out of the Maui population where *Ochrosia haleakalae* currently occurs, but the fence must be continually maintained to prevent incursion. Nonnative plants have been reduced in the Maui population that is fenced. These on-going conservation efforts for this species benefit only the Maui population. No known conservation measures have been taken to date for the threat of fire. The unmanaged populations are still impacted by these threats. Long-term monitoring and management will be required to maintain threat free areas.

## LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		<b>Species</b>	<b>2*</b>
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

### Rationale for listing priority number:

#### *Magnitude:*

This species is highly threatened by feral pigs and goats that may directly prey upon it and degrade and destroy habitat, nonnative plants that compete for light and nutrients, and fire. Threats to the dry to mesic forest habitat of *Ochrosia haleakalae* and to individuals of this species occur throughout its range and are expected to continue or increase without control or eradication. Feral ungulates have been fenced out of the Maui population where *Ochrosia haleakalae* currently occurs and from the reintroduction site in Hawaii Volcanoes National Park on the Big Island, but the fences must be continually maintained to prevent incursion. Nonnative plants have been reduced in the fenced areas of the Maui population and the Hawaii Volcanoes National Park reintroduced population. No known conservation measures have been taken to date for the threat of fire.

#### *Imminence:*

Threats to *Ochrosia haleakalae* from feral pigs and goats, and nonnative plants are imminent because they are ongoing in the unfenced areas. Threats to this species from fire are imminent (ongoing) throughout its range.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the Maui population of *Ochrosia haleakalae* is benefiting from ungulate exclosure fences funded by the Service on private land. On the island of Hawaii, the National Park Service has outplanted more than 100 plants in Hawaii Volcanoes National Park. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *O. haleakalae* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

#### DESCRIPTION OF MONITORING:

Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December 1995 and November 1996, and was updated with personal communications with Arthur C. Medeiros, U.S.G.S. Biological Resources Discipline, in 1995. The form has also been updated with information from a Service funded survey by the National Tropical Botanical Garden in late 1995 and from Art Medeiros of U.S.G.S. Biological Resources Division in 1999. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. New information was provided on status and range by Hank Oppenheimer in 2004. In 2005 we contacted the species experts listed below and confirmation of the status of *Ochrosia haleakalae* was provided by Hank Oppenheimer, Maui Land and Pineapple Company and Linda Pratt, U.S.G.S. Biological Resources Discipline.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al.* (1999b).

Two species experts have provided new information confirming the status of the species this year and the results are included in this assessment.

#### COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or

corrections (V. Caraway, pers. comm. 2005).

#### LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Linda Pratt*	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer*	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood	August 2, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

\*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004
2. U.S. Fish and Wildlife Service Controlled Propagation Database	2005

Other resources utilized:

Carlquist, S. 1980. Hawaii: A natural history, 2nd edition. Pacific Tropical Botanical Garden, Honolulu. 468 pp.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Culliney, J.L. 1988. Islands in a far sea; nature and man in Hawaii. Sierra Club Books, San Francisco. 410 pp.

D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle and global change. Annual Review of Ecology and Systematics 23: 63-88.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Friefelder, R.R., P.M. Vitousek, and C.M. D'Antonio. 1998. Microclimate change and effect on fire following forest-grass conversion in seasonally dry tropical woodland. Biotropica



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- Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.
- Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.
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- Loope, L.L., A.C. Medeiros, and B.H. Gagné. 1991. Recovery of Vegetation of a montane bog following protection from feral pig rooting. Coop. Natl. Park Resources Studies Unit, Univ. Hawaii/Manoa, Dept. Of Botany, Tech. Rept. 77.
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- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
- Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59: 1-230.
- Perlman, S. and K. Wood. 1996. Kohala Mountains Survey. Prepared for the U.S. Fish and Wildlife Service by the National Tropical Botanical Garden, January 1996.
- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9: 1-429. Cooper Ornithological Society, Los Angeles.
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- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: *in* Stone, C.P., and J.M. Scott (eds.), Hawai'i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.

- Stone, C.P. 1985. Alien animals in Hawai'i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: *in* Stone, C.P., and J.M. Scott (eds.), Hawai'i's terrestrial ecosystems: preservation and management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 251-297.
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- Wenkam, R. 1969. Kauai and the park country of Hawaii. Sierra Club, San Francisco. 160 pp.
- Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05  
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: \_\_\_\_\_ August 23, 2006  
Director, Fish and Wildlife Service Date

Do not concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005  
Conducted by: Marie M. Bruegmann, Pacific Islands FWO  
Plant Recovery Coordinator

Comments:  
PIFWO Review

Reviewed by: Christa Russell Date: September 26, 2005  
Plant Conservation Program Leader

Gina Shultz Date: October 14, 2005  
Assistant Field Supervisor,  
Endangered Species

Patrick Leonard Date: October 14, 2005  
Field Supervisor